

Date: Wednesday, 4/4/2007 8:58:40 AM
 User: Kim Johnston

Process Sheet

Customer : CU-DAR001 Dart Helicopters Services Drawing Name : X-TUBE 412
 Job Number : 31595
 Estimate Number : 12783
 P.O. Number : *nm*
 This Issue : 4/4/2007 S.O. No. : *N/A*
 Prsht Rev. : NC
 First Issue : *nm* Type : LANDING GEAR
 Previous Run : 31594
 Part Number : D412664145
 Drawing Number : D412-664-145 U/R
 Project Number : N/A
 Drawing Revision : U/R
 Material : *pln*
 Due Date : 4/30/2007 Qty: 1 Um: Each
 Written By : *nm*
 Checked & Approved By : *nm*
 Comment : Est Rev: A New Issue 07-02-14 JLM



Additional Product

Job Number:



Seq. #: Machine Or Operation: Description :

1.0 DC DOCUMENT CONTROL



Comment: Photocopy bluefile & type labels per PPPD412-664-105 CHG 001 *N/A*

2.0 D6019128 Crosstube Material



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

Pick:

Qty Part number Description Batch

1 D6019-128 Crosstube 329369

Check OD = 2.7500"; ID =

S.F 07/04/12

3.0 MORI SEIKI MORI SEIKI CNC LATHE LARGE



Comment: MORI SEIKI CNC LATHE LARGE

Turn as per Dwg D412-664-145

S.F 07/04/12

4.0 QC2 INSPECT PARTS AS THEY COME OFF MACHINE



Comment: INSPECT PARTS AS THEY COME OFF MACHINE

MS 07/04/12

5.0 QC8 SECOND CHECK



Comment: SECOND CHECK

nm 07/04/12

6.0 LANDING GEAR 1 LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Polish entire outside surface of crosstube

JB 7-4-20

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Wednesday, 4/4/2007 8:58:40 AM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31595

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description:

7.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

DP 7-4-20

8.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

JD 7-4-20

9.0

QC3/5

INSPECT WORK/WING WALK



Comment: Inspect work & Chemical conversion Coat

PRE 6-7-05-02

10.0

BENDING

BENDING MACHINE



Comment: BENDING MACHINE

Bend tube as per Dwg D412-664-145 using CNC bender program

EL 7-5-3

11.0

QC6

DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

7-4-05-140

12.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill pilot holes in tube as per Dwg D412-664-245

2-Ream hole to finish size in tube as per Dwg D412-664-245

3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-245

7-5-15

JD 7-5-15

13.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat Tube as per QSI 005 4.1

JD 7-5-15

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31595

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description:

14.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



2005-230



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

15.0

QC5

INSPECT WORK TO CURRENT STEP



2005-230



Comment: INSPECT WORK TO CURRENT STEP

16.0

OUTSIDE SERV.10

OUTSIDE SERVICES -LG



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 0380r

Issue P/O: 3825 LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

CL 7/05/24 ①

17.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage

Ensure copy of NDT results attached to work order.

CL 7/03/31 ①

18.0

QC5

INSPECT WORK TO CURRENT STEP



2005-310



Comment: Inspect for damage & ensure results are as per Dwg D412-664-203

19.0

SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

2-Paint outside crosstube with White Imron as per QSI 005 4.2

87 07-06-04

20.0

QC14

INSPECT SPRAY PAINT



2006-05 ①



Comment: Inspect Spray Paint

Wrap in plastic bag to protect from scratches

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Wednesday, 4/4/2007 8:58:40 AM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31595

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description:

21.0

D31893

Chafing Shield



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)

Chafing Shield

Batch:

31656

RT 07-06-08

22.0

D3595

Rubber Cushion (per sq ft)



Comment: Qty.: 0.0798 sf(s)/Unit Total: 0.0798 sf(s)

Rubber Cushion

Cut to .630" X 4.4" X 4 PCS

Batch:

31748

RT 07-06-08

23.0

D28931

Support



Comment: Qty.: 2.0000 Each(s)/Unit Total: 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 D2893-1

Support

29524

RT 07-06-08

24.0

D2856600

Abrasion Strip



Comment: Qty.: 0.9450 f(s)/Unit Total: 0.9450 f(s)

Abrasion Strip

1X D2856 .250" X 8.42"

Batch:

26650

RT 07-06-08

25.0

MS2192022

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 2.0000 Each(s)/Unit Total: 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 MS21920-22

Clamp

N/A

optional.

used -24 ↓

26.0

MS2192024

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 4.0000 Each(s)/Unit Total: 4.0000 Each(s)

clamp(per MIL-DTL-8783C)

batch: 101810

RT 07-06-08

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes ☒ No ☐ DQA: ☒ Date: 07/06/08
 QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Wednesday, 4/4/2007 8:58:40 AM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31595

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description:

27.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1
Assemble as per Dwg D412-664-145

Install Chaffing Shield

Instal supports with magnobond 6398 per dwg D412-664-245,
cure for 12hrs before packaging.

Time & date of application: 1200 07-06-07

Batch: 103628

25
07-06-07

28.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

29.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1
Identify and pack for shipping as per PPP D412-664-105

*****Ensure tube is not packaged if curing time is less than 12 hrs, see step 26 for application time & date

Time & date of packaging: 7/6/8 1030

Location: _____

PPP Rev: B 32178

POSITIVE RECALL

EFFECTIVE 07.04.04 AUTH UP

RELEASED [Signature] DATE 7/6/08

30.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

Job Completion



11/06/08
[Signature]

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART

DESIGN <i>QD</i>	DRAWN BY <i>QD</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>A</i>	APPROVED <i>A</i>	DRAWING NO. D412-664-145	REV. B SHEET 1 OF 3
DATE 07.03.01		TITLE CROSSTUBE ASS'Y (412 LOW-N FWD) NTS	
A	06.12.21	NEW ISSUE	
B	07.03.01	CHG RUBBER CUSHION	

PRELIMINARY ISSUE
*QD 07.04.01***PARTS LIST:**

Qty	Part Number	Description
X	D412-664-145	CROSSTUBE ASSEMBLY (412 LOW-NARROW FWD)
1	D6019-128	CROSSTUBE
1	D2856-250-842	ABRASION STRIP
2	D2893-1	SUPPORT
1	D3189-3	CHAFING SHIELD
4	D3595-063-440	RUBBER CUSHION
2	MS21920-22	CLAMP
4	MS21920-24	CLAMP
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

GENERAL NOTES:

- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6019-128
FINISHED LENGTH = 124.48±0.020 (BEFORE BENDING/TRIMMING)
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR MS21920-22 CLAMPS AND ASSOCIATED HARDWARE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-XXX-YYY ABRASION STRIPS WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-24 CLAMPS WITH D3595-063-440 RUBBER CUSHIONS TO SECURE CROSSTUBE SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB.

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DART AEROSPACE LTD		Work Order:	31595
Description: <i>cross tube (Low narrow FWD)</i>		Part Number:	0412-664-145
Inspection Dwg:	Rev:	Page 1 of 1	

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☐ Prototype

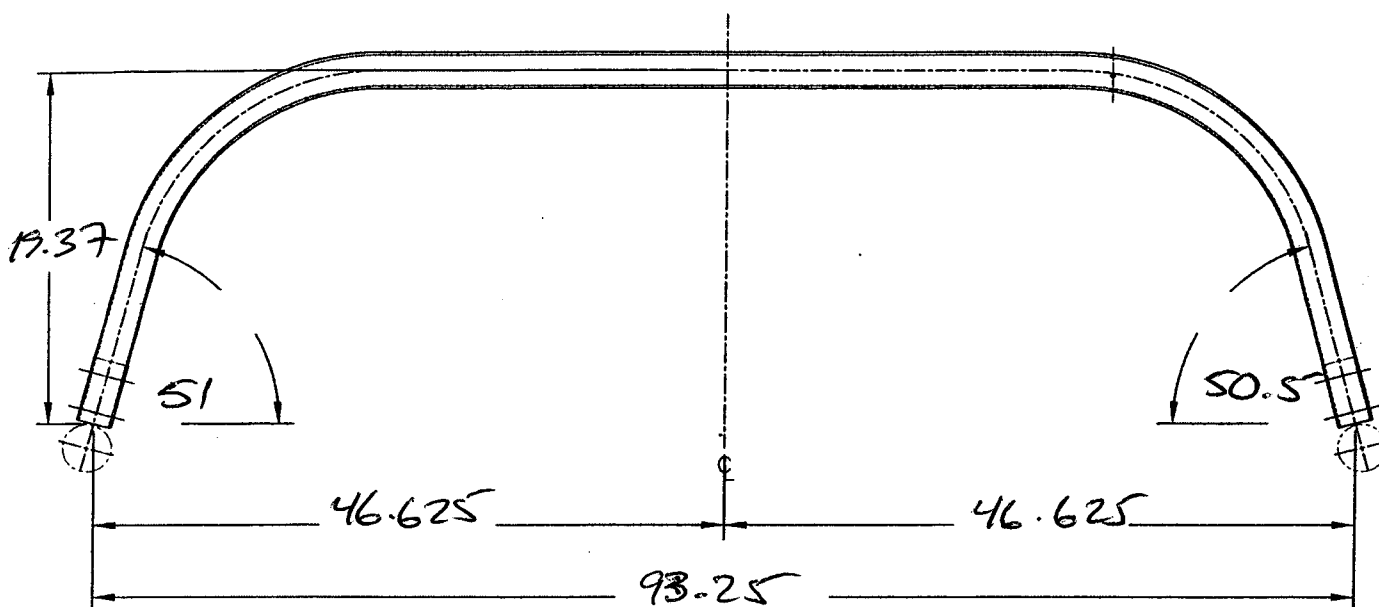
Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
2.740	<i>+ .005 - .000</i>	2.742	✓			
2.490	"	2.493	✓			
2.557	"	2.560	✓			
2.624	"	2.628	✓			
2.692	"	2.696	✓			
2.750 (stock)		2.750	✓			
2.740	<i>+ .005 - .000</i>	2.742	✓			
2.490	"	2.493	✓			
2.557	"	2.560	✓			
2.624	"	2.627	✓			
2.692	"	2.696	✓			
2.750 stock		2.750	✓			
124.476		124.490	✓			

Measured by: <i>MS</i>	Audited by: <i>me</i>	Prototype Approval:
Date: <i>07/04/19</i>	Date: <i>07/04/20</i>	Date:

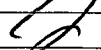
Rev	Date	Change	Revised by	Approved
A		New Issue	KJ/JLM	

DART AEROSPACE LTD		Work Order:	31575
Description: Crosstube Low Narrow Fwd (412)		Part Number:	D412-664-105
Inspection Dwg: D412-664-145 Rev: C		Page 1 of 1	

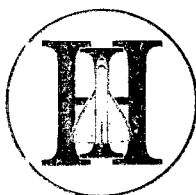
Required Dimension	Min	Max
Height	19.23	19.49
1/2 Span	46.47	46.73
Angle	49°	52°
Total Span	92.94	93.46



Comments

QC15 Inspection	 07.05.14
Date	

Rev	Date	Change	Revised by	Approved
A	07.04.27	New Issue	KJ/JM	



HeathAir

INTERNATIONAL (1991) INC.

681 Ave. Lepine, Dorval, Québec H9P 1G3
Tél.: (514) 636-1000 • Fax: (514) 636-0031

W.O. N° 36419

A.M.O. Number: 46/90

NON-DESTRUCTIVE TESTING REPORT

AIRCRAFT / COMPONENT INFORMATION

REGISTRATION:

MODEL/TYPE:

SERIAL NUMBER:

TOTAL HR/LDG:

OPERATED BY:

BASED AT:

INSPECTION REQUIREMENTS

Carry out FPI of seven (7) cross tubes (external surface) as per ASTM E-1417-05 and the Dart QSI 038, Section 4.1.1 (on file at client) - parts delivered to HeathAir.

Qty. (1) P/N D212-664-201 S/N B31360
Qty. (1) P/N D058-676-101 S/N B30250
Qty. (2) P/N D206-667-101 S/N's B29101 & B28680
Qty. (3) P/N D412-664-145 S/N's B31596, B31594 & B31595

☐ RADIOGRAPHY

☐ ULTRASONIC

☒ PENETRANT

☐ MAGNETIC PARTICLE

☐ EDDY CURRENT


INSPECTION REPORT

Fluorescent penetrant inspection was performed in accordance with the above requirements on seven (7) cross tubes.

Note: A Level 3 penetrant was substituted for the requested Level 2 (3 is more sensitive) Ardrex 970P25E Batch #04B503.

Five (5) cross tubes PASSED inspection and two (2) cross tubes FAILED inspection (P/N D212-664-201 S/N B31360 & P/N D058-676-101 S/N B30250).

THE MAINTENANCE DESCRIBED ABOVE HAS BEEN PERFORMED IN ACCORDANCE WITH
THE APPLICABLE STANDARDS OF AIRWORTHINESS

INSPECTED BY: 

DATE May 31, 2007

INSPECTION STAMP(S) Not Required

CUSTOMER INFORMATION

CUSTOMER: Dart Aerospace

P.O. NUMBER

3825

ADDRESS:

CONTACT NAME:

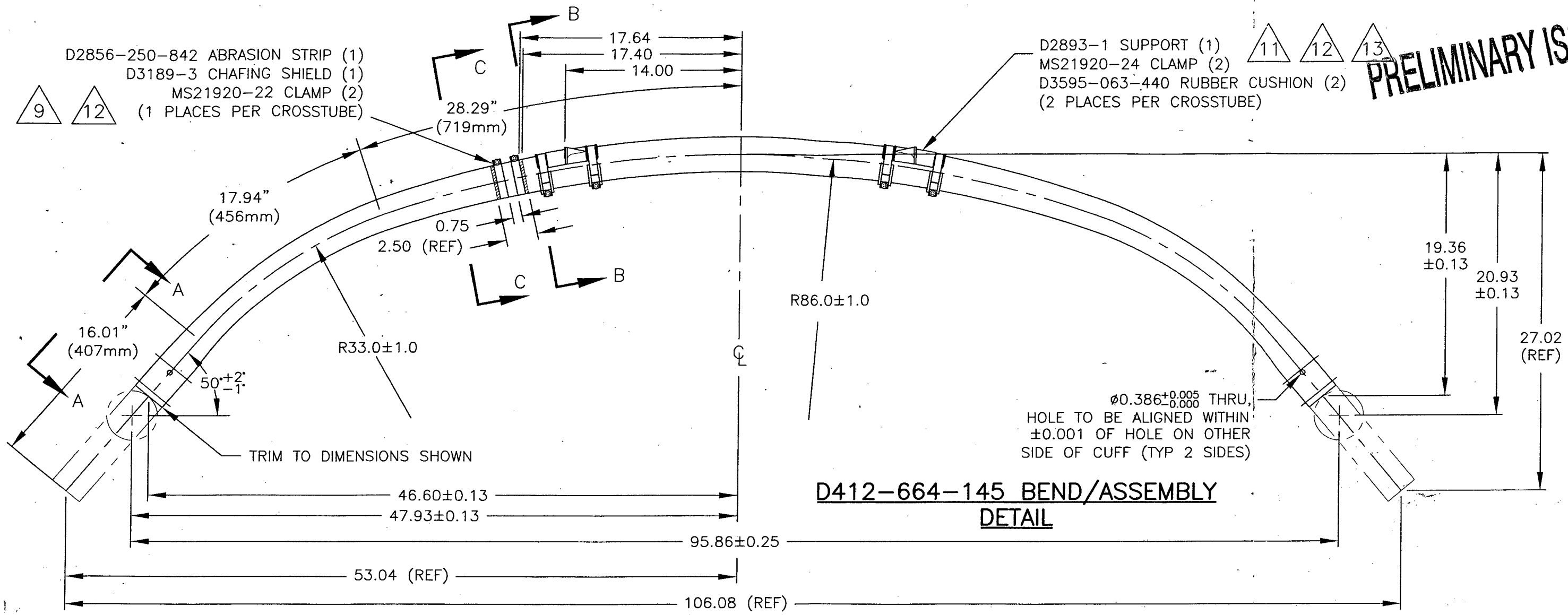
LABOUR	@	\$
MATERIALS	@	
TRAVEL EXPENSES	@	GST
HOTEL EXPENSES	@	PST

INVOICE NO.

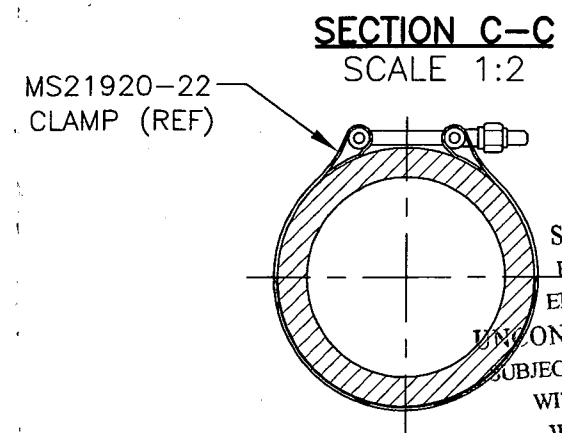
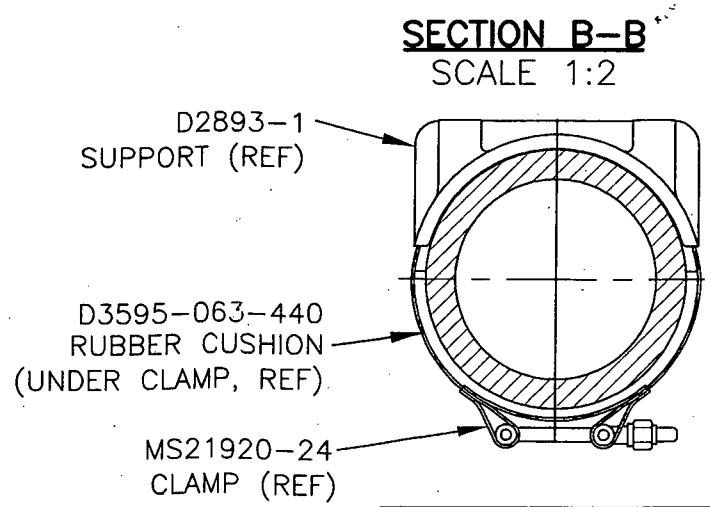
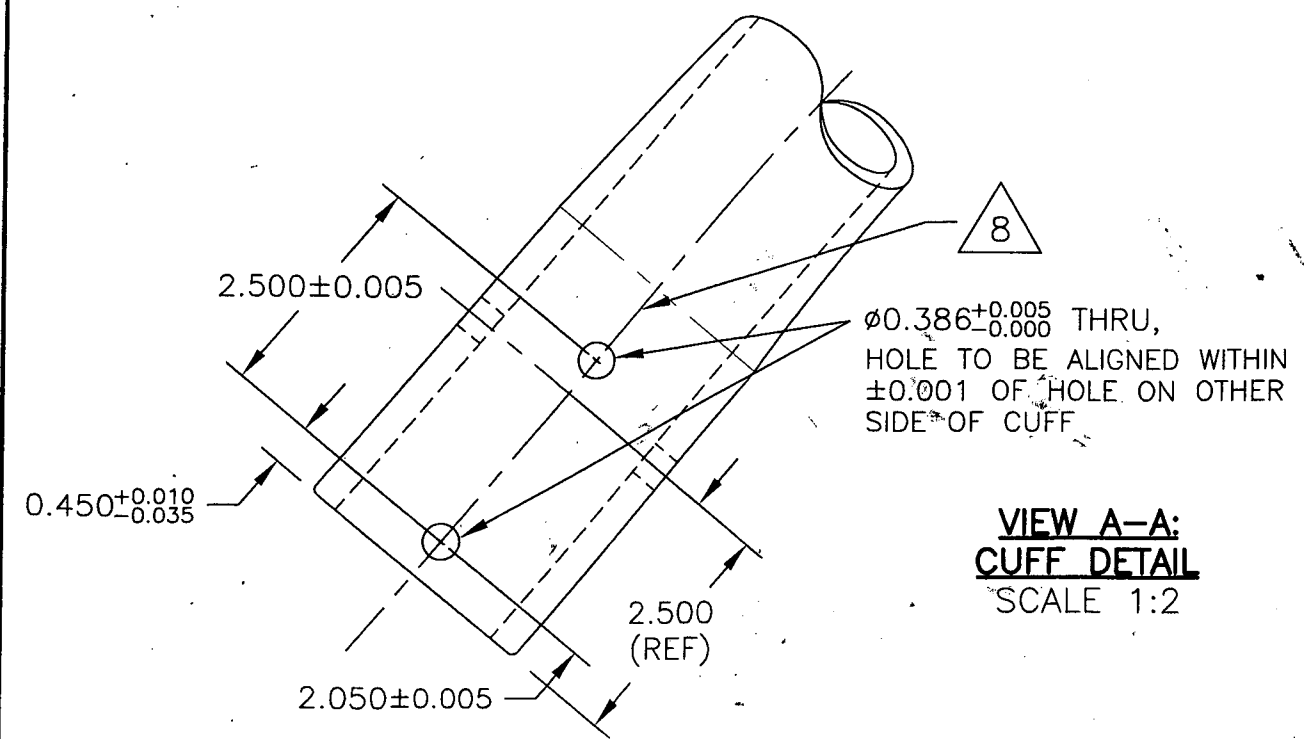
TOTAL \$

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PRELIMINARY ISSUE

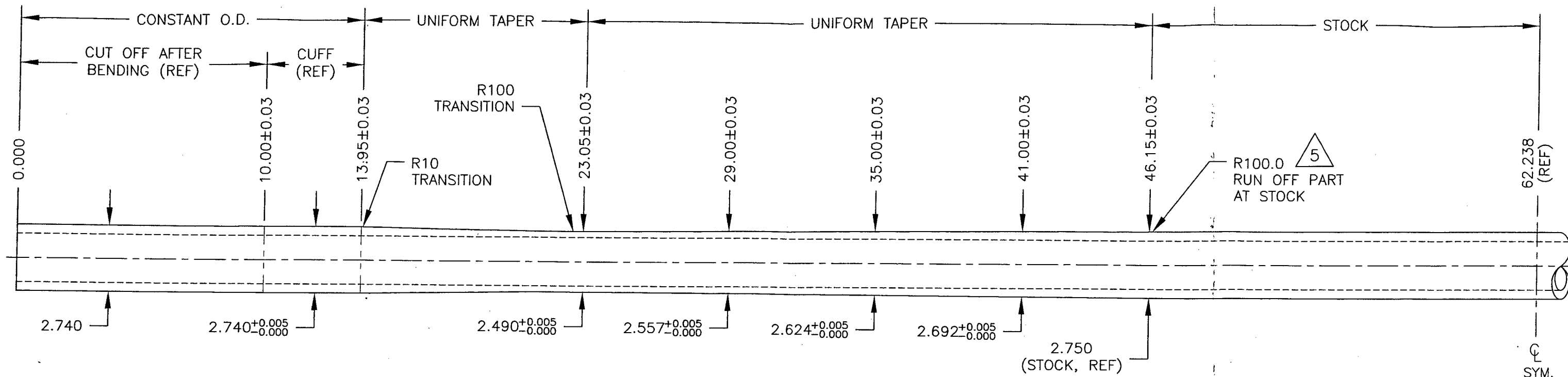


**D412-664-145 BEND/ASSEMBLY
DETAIL**



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DATE		07.03.01		DRAWING NO.	REV. B
				D412-664-145	SHEET 2 OF 3
				TITLE	SCALE
				CROSSTUBE (412 LOW-NARROW FWD)	1:8



D412-664-145 MACHINING DETAIL

PRELIMINARY ISSUE

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DATE 07.03.01		TITLE CROSSTUBE (412 LOW-NARROW FWD)		SCALE 1:4	

